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Low-Cost Expendable UAS with Application to Low Altitude Atmospheric Measurements - Phase II

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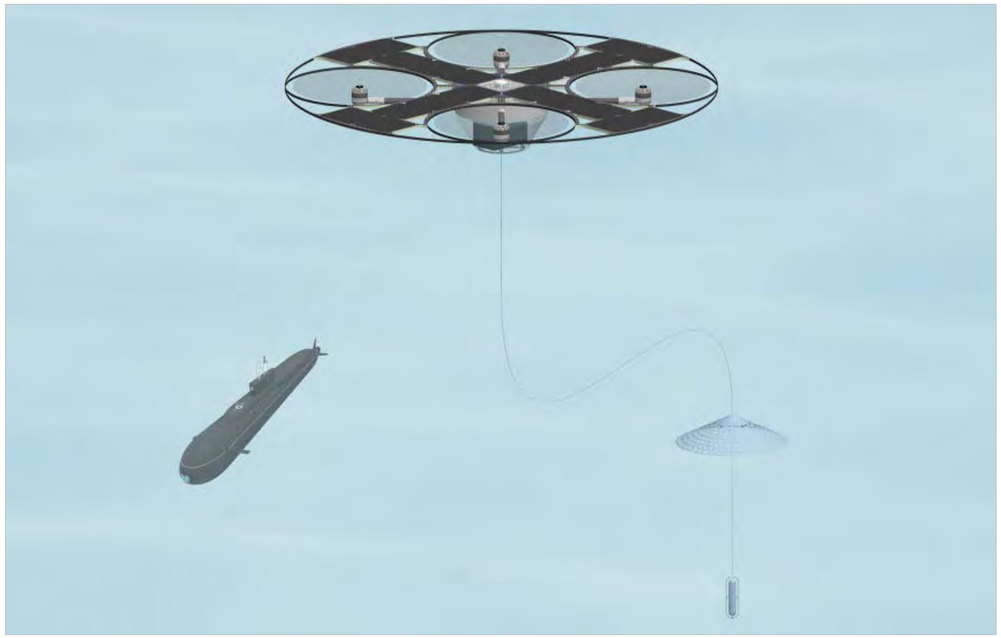
Aqua-Quad: Solar Powered, Long Endurance, Hybrid Mobil Buoy for Persistent Surface and Underwater

Naval Postgraduate School



Aqua-Quad floating with deployed acoustic sensor to detect and track underwater targets

Approach

- In this phase both hardware and software modifications are planned:
- Hardware:
  - Further harden the prototype against the marine environment
  - Integrate Iridium for global communications
  - Integrate a payload computer and notional sensors
  - Generate two flying and several non-flying models for experimentation
- Software:
  - Integrate embedded code for multi-agent collaboration
  - Integrate code for sub-optimal hybrid mobility of multiple agents

Objectives

- The original objective was to develop a proof-of-concept fleet of hybrid, ultra-long endurance, air/sea/surface vehicles with the particular goal of underwater acoustic sensing in support of USW.
- This is a continuing project, and in this phase the primary goal is to build out sufficient hardware and software to support real-world experimentation in collaboration with researchers at NUWC Keyport.
- Key objectives include:
  - Proving reliability in the marine environment
  - Identifying a suitable communication scheme for agent-to-agent, and global-reach requirements
  - Embedding the necessary algorithms for persistent operation

Motivation

- There is an ongoing need for improved autonomous methods to detect and track underwater objects, with enhanced mobility, extended endurance and global communications reach.
- The Aqua-Quad is a conceptual design to improve upon existing capabilities. It combines the air mobility and agility of a quad-copter with the underwater sensing and stealth of a sonabuoy. It achieves persistance using solar cells to recharge batteries. A passive acoustic sensor deployed below the thermocline on a tether listens for underwater objects. Cooperation with other nearby Aqua-Quads provides accurate target localization and tracking. Air mobility allows the Aqua-Quads to follow detected targets or adjust positioning for improved area coverage.

CRUSER Consortium for Robotics and Unmanned Systems Education and Research

FY17 Call for Proposals

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